



MONTGOMERY WATSON

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May 3, 1996

Ms. Sheri L. Bianchin  
Remedial Project Manager  
Superfund Division  
United States Environmental Protection Agency  
77 West Jackson Boulevard  
Chicago, Illinois 60604



Re: Upper Aquifer Investigation Technical Memorandum  
Response to Disapproval and Comments

Dear Ms. Bianchin:

This letter is written in response to your letter entitled "Disapproval of Upper Aquifer Investigation Technical Memorandum; American Chemical Service, Inc., NPL Superfund Site, Griffith, Indiana" dated April 10, 1996, as well as your April 29, 1996 Clarification of Disapproval of March 1996 - Upper Aquifer Technical Memorandum letter. As we discussed with you in several calls and meetings, both before and after receipt of your April 10 letter, the ACS Site RD/RA Executive Committee does not agree with many of the assertions made in that document. Nor do we agree with statements made in your April 29th clarification letter. As we indicated at our April 23, 1996 meeting, we believe that it is essential for our group and Agency management to meet as soon as possible to discuss these and other issues related to the ACS Site. It is imperative that we meet prior to the installation of these wells.

Despite our basic disagreements, we have developed and are submitting responses to each of your comments on our Upper Aquifer Investigation Technical Memorandum, as well as a revised Technical Memorandum with this letter. We have incorporated responses to your comments in our revised Technical Memorandum which includes installation of several monitoring wells and piezometers which we consider unnecessary for remedial design purposes and for the understanding of the hydrogeology of the site. As stated in more detail in our responses to your comments, we are acquiescing in installing those additional wells and piezometers only because you have ordered us to do so and threatened enforcement action. We continue to believe that the identified wells and piezometers are without sound technical basis.

Before turning to your individual comments, we believe it is also important to again place the original purpose and intent of the Upper Aquifer Investigation Technical Memorandum in perspective. As you are aware, the Upper Aquifer Investigation Technical Memorandum was to be an account of the Upper Aquifer Investigation (Tracer Study) methods and results, and recommendations for upper aquifer well placement, as appropriate. The Technical Memorandum was not intended to be an exhaustive or all-inclusive review of the hydrogeology at the Site. This simplified technical memorandum concept was discussed with EPA and IDEM as part of the Pre-Design Work Plan approval process and is reflected in the approved Work Plan and Schedule. The technical memorandum approach was adopted for the upper aquifer and other aspects of the pre-design studies as a means of expediting completion of that work.

As part of the discussions on the Upper Aquifer Technical Memorandum, you have raised question as to whether the Remedial Investigation (RI) was completed for the ACS Site. Apparently, you believe that the ongoing pre-design studies should be expansive enough to fill in an 'incomplete RI'. However, EPA has long considered the ACS Site RI to have been completed. In the ROD at page 5, EPA states that the RI/FS was **completed** in 1992. In the Unilateral Order, EPA again found that the RI/FS was "**concluded**" in 1992. The Agency, in fact, issued its ROD in direct reliance on the completed RI/FS. Based on these clear statements of Agency position, the RI must be viewed as done, and the pre-design studies should be allowed to proceed with the goal of developing information still needed for the final remedial design for the ACS Site.

It is also important to note that, as explained in the Technical Meeting of April 23, 1996, the results of the Upper Aquifer Investigation confirm the findings of the RI. The upper aquifer conditions at the ACS Site today are entirely consistent with our findings of 1989 and 1990 and monitoring since that time. Nothing in the latest investigatory findings would lead to a conclusion that something had been overlooked or missed during the RI so that additional upper aquifer nature and extent work would be necessary at or around the ACS Site.

In your clarification letter, you state that the Technical Committee did not believe that any confirmatory wells were necessary. This is an incorrect statement of the position taken by our Group. As stated in the original Technical Memorandum and the April 23 meeting, we were and remain willing to install new wells at the ACS Site. In our original Technical Memorandum results (page 10 and Figure 5), we proposed to install six new monitoring wells based on the Tracer Study. During the April 23rd meeting, in response to questions raised by the Agency, we proposed to install three more wells in addition to six proposed in the Technical Memorandum. As noted in the opening to this letter, in our revised Technical Memorandum, we have indicated that we will add wells and piezometers at the locations ordered by EPA. However, as explained during the April 23rd meeting and in our responses to comments, we continue to believe that certain of those wells and the piezometers are not needed for remedial design purposes. We are installing those wells and piezometers in direct response to your threat of enforcement action, rather than because they answer a technical need.

We believe that the situation which has developed in relation to the Upper Aquifer Investigation Technical Memorandum is an unfortunate one. Technical disagreements should be resolvable through discussions between the parties rather than under the threat of orders and enforcement. This is especially true in light of the Executive Committee's clear commitment to expediting the remedial work at the ACS Site. In order to avoid the recurrence of this situation, we request that a procedure to resolve real technical disputes be established for this project. The establishment of such a procedure would be one of the topics of discussion for the meeting between the group and the agencies' managements.

Turning to your specific comments, as noted, we disagree with many of the statements made. With this letter, we are resubmitting a Technical Memorandum which responds to your comments by deleting certain information which we continue to believe to be technically accurate and adding

certain wells and piezometers that we believe are unnecessary. Our positions are reflected in our comment responses. Our purpose in providing the revised Technical Memorandum is to allow this project to proceed without further delay. However, our revisions should not be construed as reflecting agreement with all of EPA's asserted positions. Once you have had an opportunity to review these responses and the revised Technical Memorandum, we believe that the meeting between the Group and U.S. EPA/IDEM would be the appropriate forum for continuing the discussion on these items.

We suggest that the meeting with the agencies be scheduled as soon as possible. We are available to meet on May 16th or May 21st at 1:00. Please call and let us know which of those dates is preferable as soon as possible.

### **Responses to Comments**

The following is a transcription of the March 15, 1996 U.S. EPA comments on the Upper Aquifer Technical Memorandum, with responses included.

### **ENCLOSURE**

#### **Review Comments**

Upper Aquifer Investigation Technical Memorandum, March 15, 1996  
American Chemical Services, Inc.  
Superfund Site, Griffith, Indiana

### **GENERAL COMMENTS**

1. There is a tendency to overstate the significance of the results of the field screening results. While the results are meaningful, it is important to realize the limitations of the data since it is only screening level data. The intent of the screening-investigation was to obtain an inference of the plume(s) boundaries; these inferences must be verified subsequently with the installation and sampling of a monitoring network. Hence, rewrite the text to 1) explain the goals served by the upper aquifer investigation; 2) explain the data including the data limitations; 3) provide reasonable conclusions along with rationales; and 4) provide recommendations and proposals along with the corresponding rationales.

In response to U.S. EPA's requirements, Montgomery Watson developed detailed SOPs for collecting the upper aquifer samples and for operation and QA/QC of the field gas chromatograph (GC). The SOPs were followed fully, and resulted in useful data. The GC field screening was used appropriately. The conclusions developed in the Technical Memorandum are not based solely on these results. The field screening played a supplemental role in developing the extent of contamination.

The text in the Technical Memorandum already accomplishes the numbered items at the

end of the U.S. EPA comment. 1) The goals for the investigation in each area were clearly stated in the approved SOW and they were re-stated in the Technical Memorandum for each of the four Areas, A - D. 2) The limitations of the data are discussed in the Technical Memorandum. The discussion of uncertainty regarding the source of the low acetone concentrations (<50 ug/l) is a primary example. 3) Reasonable conclusions are presented in the Technical Memorandum for each of the investigation Areas, A through D. They are clearly labeled "Conclusions" with an underlined header. 4) Recommendations to place new upper aquifer monitoring wells were made on Page 10 and included the rationale for each location .

2. It is unclear if the structures portrayed on the maps have been surveyed in and are accurately depicted on the maps. This is important in visually understanding the character and extent of the contaminant plume.

Several structures (building outlines) are included on the basemap and therefore appear on Figures 1 - 6. The total number of structures shown on the maps have been kept to a minimum to reduce overall clutter. The coordinates for these in the original maps were derived from the topographic map based on the 1994 aerial photographs. One corner of each of these buildings was surveyed to confirm that they are accurately located on the basemaps. The coordinates of the four sides of the new pond constructed south of Reder Road have also been surveyed and will be included in future maps.

3. It is unclear whether the residential well discussion and represented locations refer to all or part of the private drinking water wells (e.g., residential wells) in the area of the site. The document needs to illustrate the location of all private wells near the site, indicate where the wells and discuss sampling those that may potentially be impacted by contamination migrating off-site. In addition, the report needs to state the intended analytical parameters for the proposed residential well samples. Lastly, as is mentioned further below, full scan analyses of these residential wells would be prudent for the first round of sampling. (See also specific comments below).

A residential well search is being conducted in the vicinity of the ACS Site. As agreed in the weekly conference call with the U.S. EPA, the findings will be included in the Lower Aquifer Technical Memorandum that will be submitted to the Agencies on May 3, 1996. The four residential wells proposed for sampling in the Upper Aquifer Technical Memorandum were specifically selected because they were located in the direct vicinity of the zone of benzene contamination delineated along Colfax Avenue. They were identified by a Montgomery Watson geologist, going door-to-door along Colfax Avenue and Reder Road, talking to each resident to ascertain the source of their water supply. The Technical Memorandum has been revised to state that full scan analyses will be performed for these initial four residential wells.

An alternative to providing the above-requested information regarding all the private well users in the revised upper aquifer technical memorandum is to include this information in the lower aquifer technical memorandum. However, Respondents must still sample the four (4) proposed wells for full scan to coincide with the collection of the groundwater samples from the new upper aquifer wells.

Full scan analysis is unnecessary and excessive for two reasons: 1) numerous sampling events have indicated that the contaminants of concern migrating off-site consist of the volatile organic compounds and 2), volatile organic compounds are more conservative than the semi-volatile compounds, PCBs, pesticides, and metals. However, at the direction of the U.S. EPA, the Technical Memorandum has been revised to provide such sampling for these specific wells. Being more conservative means that they are much more likely to travel with the groundwater. If no volatile organic compounds have migrated from the site to the sampled residential wells, it is technically valid to conclude that there is no completed pathway for the other, less conservative compounds, including the semi-volatile compounds, pesticides, PCBs, and metals.

4. The number and location of proposed additional upper aquifer monitoring wells; however, the presentation of data makes it difficult to appear inadequate adequately determine where additional wells are needed. First, the inferred plume is difficult to correlate with the existing ground water contours. Further, contour maps illustrating benzene, acetone, and total organic compound concentrations need to be provided to evaluate the distribution of these contaminants and the appropriate locations of additional monitoring wells. A map needs to be provided that illustrates all existing upper aquifer monitoring wells and piezometers, as well as proposed additional monitoring wells and groundwater elevation contours. When selecting the network, consider that the ultimate goal of this investigation the monitoring network will be used to verify the character, nature and extent of contamination today and over time. As is presented in the specific comment 26 below, U.S. EPA believes additional upper aquifer wells are necessary. In specific comment 26 below, U.S. EPA has shared its specific judgments of the deficiencies in the proposed monitoring network. U.S. EPA's opinions may change somewhat when the technical memorandum is supplemented with the information requested by U.S. EPA.

Most of what the U.S. EPA is requesting here was already included in the Upper Aquifer Technical Memorandum. The five figures in the first submittal of the Upper Aquifer Technical Memorandum contained the water table contours from the October 30, 1995 water level measurements. Figure 1 showed the existing upper aquifer wells and piezometers. Figure 5 showed the groundwater contamination plume as established by the upper aquifer field screening, and also showed the proposed monitoring well locations. All figures were purposefully provided at the same scale so that comparisons between any and all maps can be easily made.

It is not possible to develop a meaningful "contour map" of contaminant concentrations from the data developed for the Upper Aquifer Investigation. The sampling points were selected specifically to identify the outer extent of contaminant migration, and therefore, they are generally representative of the lowest concentrations at the site. Contour plots are useful when there is a range of contamination concentrations from high to low. The only meaningful "contour" line for the objectives of the upper aquifer investigation is the "zero" line which was presented on Figure 5.

A new figure has been added following Figure 4, and Figure 5 has been modified and renumbered as Figure 6 in the re-submitted Technical Memorandum. The new Figure 5 is a plot of total volatile organic concentration levels detected by field GC. Figure 6 (revised Figure 5) includes water table contour lines, the "zero" contaminant detection line, the existing monitoring wells and piezometers, and the locations of the new monitoring wells and piezometers proposed to complete the upper aquifer investigation.

5. The significance of the surface water sample needs discussion. Certainly the level of contamination found begs discussion and a proposal for additional work now that we know of the contamination. See also other specific comments below.

A zone of VOC contamination extends from the ACS site northward as shown on Figures 5 and 6. The zone ends in the vicinity of the drainage ditch that enters the site north of the ACS facility. The sample was collected near this ditch. It seems likely that the groundwater is discharging to the ditch. This is supported by the existence of benzene in the surface water sample, and the observation that the zone of benzene contamination in the upper aquifer does not extend significantly beyond the ditch. Further surface water sampling will be conducted in the wetland sampling planned for the summer. Assuming approval of the PGCS design by the U.S. EPA, the PGCS will be installed within the next year, and it will cut off the benzene contamination that is migrating off site to the north. Therefore, the source of the benzene and the seep will be cut off. All these actions are being conducted on an expedited schedule, so that remediation will occur far sooner than under the ROD remedy.

6. With regard to the issue of abandoning wells, U.S. EPA will defer comments until we see a proposal and data summary from the Respondents.

U.S. EPA requested, and so we have proposed timely abandonment of the six production wells at the ACS Site. We continue to believe that proper abandonment of these wells is appropriate.

7. Piezometer, P-57, as proposed in Respondents' technical memorandum dated November 8, 1995, should be installed.

The purpose of the piezometers is to provide water elevations at enough locations to provide an accurate indication of the water table configuration across and surrounding the

site, and aid in the evaluation of the groundwater flow pathways. At this time, there are over sixty piezometers at the site. The existing piezometers, along with the results of the field screening leave no ambiguity as to the water table configuration and the groundwater flow paths northeast of the ACS Site. Adding P-57 at this time would serve no technically significant purpose. Therefore, it is recommended that P-57 not be installed.

8. A staff gauge should be installed in the retention pond south of Colfax Avenue and Reder Road, as verbally proposed by Respondents.

A staff gauge will be installed prior to the next round of water levels collected at the site (assuming access can be gained). A surveyor will provide coordinates of the four sides of the pond, as well as reference elevation for the staff gauge, so that the pond and the staff gauge can be represented on the site map.

#### **SPECIFIC COMMENTS**

9. **Page 1.** The report states that the top-of-casing elevations for piezometer P-52 and monitoring well MW-18 were resurveyed during the Upper Aquifer investigation. The new survey values are presented, but the document does not discuss the difference between the old survey values or state the effect on the groundwater flow patterns. It is not clear if the elevations P-52 and MW-18 are different than previously determined. The text should note any changes and their significance, or at least note where this is discussed. If no significant difference are attributed to the resurveyed elevations this point should also be made.

The reference elevation for MW-18 was found to be correct. The reference elevation for P-52 was found to have been incorrectly reported in November 1995. The modification of the reference elevation for P-52 was made for the water table plots in Figures 1 - 5. The change resulted in a minor change in the orientation of the contour lines defining the "water table" in the wetland east of the ACS Site. However, the field screening results showed that the zone of contamination does not extend out into the wetland. Therefore, the resulting change in contour lines was not significant to the objectives or findings of the Technical Memorandum.

10. **Page 1, 2nd paragraph.** The boundaries of bulleted areas A,B,C and D described in this paragraph are not clear. Present the boundaries of these areas on Figure 1.

Areas A, B, C, and D were selected in the SOW to represent general areas that should be investigated with specific procedures. The areas are general and so the representation in Figure 1 is general. The letters A, B, C, and D are clearly marked and discussed in the text. No modifications to Figure 1 are necessary.

11. **Page 2, 3rd paragraph.** Present the location of MW-9 on Figure 1.

**The U.S. EPA dictated the locations for the eight deep groundwater samples. The reason for collecting the samples was that the U.S. EPA requested that they be collected.**

10.8

14. **Page 5 & 6, Results and Conclusions.** The document states the suspected reasons for the presence of acetone at the site, including analytical difficulties, common laboratory contaminants and identification of acetone in vegetation, insects and bacteria as a naturally occurring metabolite. The analytical difficulties add to the complexity of interpreting the data. However, since the other hypotheses are not supported, these paragraphs should be deleted or at least substantially qualified. Discuss further the data quality, usage and limitations.

Clearly, acetone exists as a contaminant at the site. Figure 4 was developed to show the concentrations that were detected. The discussion on page 5 and 6 are specifically focused toward the low level detections (<50 ug/l) of acetone. It is important to keep focused on the objectives of the field screening that was conducted for this Technical Memorandum. The purpose of the field screening is to identify the locations to install additional upper aquifer monitoring wells. The results from sampling those wells will be used to resolve the acetone anomaly. The following discussion is valid, but it has been deleted from the Technical Memorandum at the direction of the U.S. EPA:

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well-suited for purge and trap GC analysis utilized for this investigation since it is a highly volatile and polar compound. Because the purge and trap methodology produces moisture within the system, acetone may be attenuated within the trap by the moisture and subsequently elute during multiple purge and trap analyses. In laboratory settings, acetone is a common contaminant which most analytical laboratories equipped with rigorous QA/QC procedures do not report at concentrations less than 20 ug/L.

Acetone has also been identified in vegetation, insects and bacteria as a naturally occurring volatile metabolite. Acetone is a breakdown product of alcohols and is produced through anaerobic degradation of organic matter. Near the ACS site, where wetland areas and farm fields are abundant, organic matter is available in soils at high concentrations (percent levels) for anaerobic degradation and may be contributing to the production of naturally occurring acetone.

Therefore, detections of low concentrations of acetone with a field GC (i.e., less than 50 ug/L) should be viewed as probable instrument cross-contamination or naturally occurring breakdown products, rather than viewed as representative of groundwater contamination.

There are multiple hypotheses that may be generated in explaining the widespread detection of acetone on-site, however, it is important to keep in mind the quality of the data generated by this type of investigation. Hence, the limitations of this data should be clearly stated since it will affect the conclusions. Furthermore, since acetone levels are very high in some locations, it is appropriate to discuss how these high levels may have effected detection limits of other parameters of interest. The most likely hypothesis that can be drawn from the data is that there is widespread "contamination" of acetone on site. Also, confirmatory samples which will be analyzed under strict QA/QC protocols and validation criteria will help define the contamination.

One potential factor of significance is that if these high levels of acetone do reflect lab "contamination", then the validity of all data, in general, is suspect due to the doubts cast on the quality assurance/quality control (QA/QC) of the collection and analysis of the samples. All data should then be further qualified.

Also, it seems inappropriate to attribute acetone concentrations to natural processes or lab contamination alone (especially with concentrations of 50 ug/l and greater). Further, there is no evidence to suggest that natural processes have contributed to acetone concentrations detected. Lab contamination is an inadequate explanation for detected concentrations of acetone which were less than 50 ug/l because high concentrations of acetone were found upgradient of these samples. At the 45 sampling locations where acetone was detected, 28 locations had validity of the aforementioned claims can be evaluated, supporting technical documentation must be provided. Confirmatory samples which will be analyzed under strict QA/QC protocols and validation criteria are necessary.

In addition, scientific documentation which discusses that acetone is naturally occurring in a wetland environment should be provided. When evaluating the concentrations (ranging from non-detect to 50.600 ppb) as provided in this document, it appears unlikely that the acetone is naturally occurring. Acetone is not easily formed due to the need to form a double bond. When alcohols break down, the final compound to be would be methane and water. Furthermore, acetone is very volatile and may well volatilize off during the exothermic reaction produced during the breakdown process of the alcohols and the resultant methane. Thus, a minimal amount would be present, if at all. Lastly, since acetone has the potential to migrate as rapidly and/or more rapidly as benzene, then it may help to explain why acetone is found at the leading edge of the groundwater plume.

**15. Page 6, paragraph 2.** As discussed above, the text states that low concentrations of acetone detected during the investigation "... should be viewed as probable instrument cross-contamination or naturally occurring breakdown products rather than viewed as representative of groundwater contamination." Based upon the frequency and magnitude of acetone detections this statement appears presumptuous. Furthermore, acetone was selected as a contaminant of concern in the ROD. Supplement this discussion to at least talk about acetone as a contaminant of concern at this site.

The purpose of this paragraph is to explain why the "low concentrations" of acetone are not being overly analyzed. It is not relevant to add text to this paragraph regarding the high acetone concentrations detected at other locations that clearly are site related.

The ROD lists the "Final Remediation Level" for acetone as 2,300 ug/l (to meet the HI =1). Therefore, it is valid to consider concentrations below 50 ug/l as of little significance.

**16. Page 6, Area A, Results.** As mentioned above, it is possible the high concentration of acetone may effect detection limits, such as at GP58. Hence, it is possible that the detection limits changed from GP57 to 58. Discuss further the data quality, usage and limitations.

The purpose of the introductory discussion of low acetone concentrations, was so that the specific discussion of "real" acetone could be carried out, as is done in the section referenced in this comment. U.S. EPA's request for further discussion is not relevant to this section of the report. However, in response to the U.S. EPA's comment, the discussion of the low acetone concentration has been removed from the text of the Technical Memorandum.

**17. Page 6, Conclusions, last paragraph, first sentence.** Add the word approximate before the word extent.

The word "approximate" has been added to the text.

**18. Page 6, Conclusions, last paragraph, second sentence.**

Further explain the use of "zero" in the context of the line of "zero" contamination. It should be explained to state that the line of "zero" is the relative area where VOC contamination dropped to below reportable limits.

Quotation marks are used around the word zero for this express purpose. Text has been added to define this usage of "zero."

**19. Page 7.** Upward gradients in the wetland are hypothesized as controlling the VOC plume extent. While this is a reasonable hypothesis for the dissolved phase, it can be easily verified with a monitoring network installed later. Piezometers will verify gradients. If necessary, samples could also be obtained of both the groundwater and surface water. Periodic surface water sampling would seem important if this is true. Also, since PCB transport is still an issue, then surface water sampling is even more important. Discuss how these hypotheses will be verified.

Piezometers are not necessary to verify the hypotheses. It is a basic hydrogeologic principle that if groundwater is discharging to a wetland, or other surface water body, it does so because there is an upward hydraulic gradient. The water levels shown by the water table contour lines and the existence of the wetland is verification of the discharge. Since the total saturated thickness of the upper aquifer in this area is less than ten feet, there may be only a slight difference in head levels. Also, the zone in which the upward gradient will occur will move back and forth horizontally throughout the year as the water table rises and falls. Installation of additional piezometers is unnecessary. Furthermore, the PGCS will be operational within one year and the extraction trench component of the PGCS will contain sets of piezometers in this area.

PCBs have been found at low levels in the samples from the wetland. It is unclear whether the U.S. EPA is suggesting that the migration pathway for the PCBs is via groundwater. This seems unlikely since PCBs are hydrophobic and tend to partition to the aquifer matrix material rather than migrate with the groundwater.

**20. Page 8, Conclusions, last paragraph, first sentence.** Add the word approximate before the word extent.

The word "approximate" has been added to the text.

**21. Page 8, Conclusions) paragraphs 2 - 4).** Regarding the references to the UST and pipeline as potential sources of BTEX contamination, there is not sufficient data to support that the UST and pipeline are contributing to BTEX contamination. Provide additional information to support this inference or delete the inference.

The text does not say that the UST and the pipeline are THE source. It says they may be contributors to the plume. That is a reasonable assertion; IDEM has the report from the Town of Griffith, regarding the removal of the leaking UST at that location.

**22. Page 8, last paragraph (Conclusions).**

Delete the paragraph. There is no basis for stating that VOC concentrations in area C are "not significant". It is inappropriate to attribute acetone to natural processes or lab contamination. (See previous comments). A more appropriate conclusion would include further study of this area, including quarterly monitoring well sampling of M-1S and MW-15.

The paragraph has been modified to show the comparison between the "detected" concentrations of acetone and the "Final Remediation Level" for acetone of 2,300 ug/l listed in the ROD.

**23. Page 9, Conclusions, second to last paragraph, first sentence.** Add the word approximate before the word extent.

The word "approximate" has been added to the text.

**24. Page 9, Conclusions, last paragraph, first sentence.** Add the word approximate fore the word extent.

The word "approximate" has been added to the text.

**25. Page 10, Area C bullet.** This references a monitoring well "MW01". It appears that this reference is for the Griffith Landfill well M-1S. This needs to be corrected, to prevent confusion with the ACS MW-01 well that was destroyed in 1990.

The text has been modified in the revised Upper Aquifer Technical Memorandum.

**26. Page 10.** Based upon the information provided, following are U.S. EPA opinions and recommendations of the proposed monitoring network. Although final well locations will be verified by U.S. EPA and IDEM in the field, Respondents should provide a proposal which considers the following.

**a) Area A:**

Surface water sampling should be planned. Nested piezometers should be installed to verify gradients and allow for periodic chemical water quality samples to be obtained. Piezometers will be relatively easy to install and maintain. Locations should be on either side of the hypothesized chemical boundary and there should be a total of 6, two-piezometer nests installed. Given the historic conditions noted in MW 10 and vicinity, wells will likely be needed to show chemical changes through time and

should be anticipated.

Surface water sampling was planned in the Pre-Design work plan and will be conducted later this year. The existence of the wetland and the clearly defined edge of the plume is verification of the vertical gradients. Piezometers will be of limited value in defining vertical gradients in the upper aquifer because of the limited thickness (<10 feet) of the upper aquifer, and because the edge of the wetland is not stationary. Further, sets of piezometers will be installed in this area as part of the performance verification for the extraction trench for the PGCS.

However, as directed by the U.S. EPA in the April 29, 1996 clarification letter, the text of the Technical Memorandum has been modified to include piezometers in sets of two, at four locations. These are shown on Figure 6 as N-1, N-2, N3, and N-4.

An additional monitoring well is suggested approximately 100 feet southeast of the midpoint between MW-13 and M-5S. This distance between MW-13 and M-58 is over 1000 feet, and MW-14, the closest monitoring well between these wells, is contaminated. Hydropunch samples analyzed by a field GC can aid in the placement of monitoring wells; however they cannot reliably rule out the need for a monitoring well. Reliable long-term monitoring will require a well in the recommended location.

The wetland presents a hydraulic barrier that is similar to the effect of a lake. The water surface on a lake is flat, and therefore there is no horizontal gradient across the lake. This factor was understood during the RI and it is the reason that monitoring wells have not previously been placed in the wetland. The field screening investigation confirmed that there is no contaminant migration significantly beyond the "shore" of the wetland. The concentrations abruptly change from levels measured in the thousands, to non-detected, in a matter of a few feet. There is limited technical basis for installing any monitoring wells in the upper aquifer at this location.

However, at the insistence of U.S. EPA, a well is proposed for installation at this location. It is labeled "J" on Figure 6 of the revised Technical Memorandum.

**b) Area B:**

The inferred plume is difficult to correlate with the existing ground water contours. In addition, it is necessary to measure plume concentrations both within and on the edge of the inferred plume.

The plume is overlaid directly on the existing contours in Figure 6 (Figure 5 in the Technical Memorandum draft submitted in March 1996). While the contours do not extend beyond P-62, the plume that is defined by the "zero" line is clear and consistent with the extension of contour lines in the area.

Two wells are recommended (a cluster at each location) along the inferred plume axis, in addition to the well locations already shown. One monitoring well is suggested approximately 150 feet northeast of P-62, to provide adequate monitoring coverage of this area. An additional monitoring well is suggested approximately 500 feet south of P-62, to better define the nature of contamination within this area.

At the meeting with U.S. EPA and IDEM on April 23, 1996, the ACS Technical committee agreed to install an additional well interior to the plume extending southeast from the site. It is discussed on page 10 of the revised Technical Memorandum and it is labeled "I" on Figure 6

**c) Area C:**

No additional wells may be necessary for area C; however, wells MW-1S and MW15 should be added to quarterly monitoring to ensure adequate coverage of these areas. Delete or qualify the second sentence of this paragraph, which attributes acetone detection to field GC or natural processes.

At the detected concentrations, these do not represent significant contamination, in comparison to the "Final Remediation Level" for acetone, listed in the ROD (2,300 ug/l). This qualification is provided in the text of the revised Technical Memorandum. Given this fact, it may not be appropriate to include M-1S and MW-15 in the quarterly monitoring plan. However, at the U.S. EPA request, wells M-1S and MW15 will be considered for inclusion in the quarterly monitoring plan.

**d) Area D:**

The proposal for the wells designated E and F are insufficient. Given a linear expanse of more than 1,000 feet along the northern portion of the study area and the distance from the source areas the following is needed:

An additional upper aquifer monitoring well in the northern area of the plume was agreed to at the April 23, 1996 with U.S. EPA and IDEM. It is indicated by the symbol and letter "C" on Figure 6 of the revised Technical Memorandum.

i) Samples are needed at a minimum of 4 locations on the northern boundary of Area D are recommended. At least two locations will consist of a shallow and deep pair of wells in the upper aquifer. Drilling shall be to and confirm the clay layer. If the upper sand is less than 15 feet thick in this area, single wells with a 10 foot well-screen should be allowable in lieu of the two well cluster.

At the insistence of U.S. EPA, two additional wells have been added to the upper aquifer investigation inside the contaminant plume zone north of the ACS facility. These are indicated by the symbols and letters "L" and "M" on Figure 6 in the revised Upper Aquifer Technical Memorandum.

The ACS Technical Committee does not feel that either of these monitoring well locations is appropriate at this time. Location "M" is interior to the area of contamination and does not provide any additional information needed to proceed with the remediation. Nor is it certain at this time that it will be a useful monitoring point after the PGCS has been installed and is operational. Location "L" is within the planned alignment for the groundwater extraction trench for the PGCS. If it is placed at this location, it will be damaged during the construction of the extraction trench. It may be that a compliance monitoring well will be useful in this vicinity at some time in the future, but that decision would be better made after the PGCS has been installed and is operational.

ii) Several shallow well clusters are anticipated along Colfax Avenue. A monitoring well is suggested between P-58 and P-59 just outside the line where benzene was detected, as specified on figure 5. This well will provide coverage of the area between MW-11 and MW-12, which are over 1000 feet apart. A monitoring well is suggested near P-63 to better define the nature of contamination in this area.

During the discussion with U.S. EPA and IDEM on April 23, 1996, the ACS Technical Committee agreed to place an additional upper aquifer monitoring well at the location discussed above. It is indicated by the symbol and letter "D" on Figure 6 in the revised Upper Aquifer Technical Memorandum.

**27. Page 11, paragraph 2, Residential Well Identification and Sampling.**

It is unclear whether the residential well discussion and represented locations refer to all or part of the area residential wells. The document needs to illustrate the location of all private wells near the site, and discuss sampling those that may potentially be impacted by contamination migrating off-site. Provide a map or database of all known drinking water wells in the area. Also, include a discussion of the local businesses in the area, including if the businesses have a private well which is used as a potable drinking water source. Include on a figure the location of the municipal water supply lines and provide a brief discussion of the municipal water supply. This will avoid any confusion as to the elimination of certain residences/businesses from sampling consideration in the vicinity of the site.

**See response to General Comment 3.**

As previously discussed, there may be additional drinking water wells (primarily residences) which will need to be included in this sampling round.

The residential wells proposed for sampling are screened in the lower aquifer, and are located south of the site. Any wells in

the area that are in the upper aquifer should be proposed for sampling. Given that the gradient of the lower aquifer is northerly, residential and industrial wells downgradient (north) of the site should also be identified and sampled.

Finally, residential well samples should be analyzed for the full scan of analytical parameters to assure that no contamination escapes detection to be the most protective of human health. Provide rationales for the residences which are proposed to be sampled.

**See response to General Comment 3:**

**28. Page 11, last paragraph.** This states that "One surface water sample was collected near P-61 north of the ACS facility (Figure 2)." The report previously states that the sample collected near piézometer P-63, and Figure 2 does not illustrate the location of the surface water sample. This needs to be corrected.

**The text of has been corrected in the revised Technical Memorandum.**

Furthermore, no conclusion is provided on how the Respondents intend to proceed based on this new information. Clarify this approach.

**Clarification has been added to the text in the revised Technical Memorandum.**

**29. Page 11, Surface Water Samples.** The surface water sample location was not plotted on the map. The surface water sample appears to have been collected near P-63, rather than P-61. Include the sampling location and ditch on figure 2.

Given the levels found, more surface water sampling will be necessary. The hypothesized upward gradients in the wetland also point to the need for additional surface water sampling. Discuss how this will be approached and provide a proposal. Results, conclusions, and recommendations for the surface water sample location should be included in the text.

**The need for surface water sampling has been anticipated and is included in the Pre-Design Work Plan as the Wetland Investigation. This additional sampling, which has already been discussed and agreed to with U.S. EPA and IDEM, will be conducted during the summer, following approval of the QAPP.**

**30. Table 1.** Include all wells on Figure 1. For instance, MW 10C is not shown and should be included.

**The subject of this Technical Memorandum is the upper aquifer. Monitoring Well MW-10C is not an upper aquifer monitoring well, therefore, it is not included on Figure 1.**



31. **Table 1, Summary of Sample Coordinates and Depths.** The text indicates that GP-54 was not sampled. Also, incorporate the east/north coordinates.

This modification was made in Table 1 of the revised Technical Memorandum.

32. **Table 2, Tabulation of Selected VOC Detections Upper Aquifer Investigation.** The column of total VOCs appears to be misleading. It appears that the total column is a total of acetone, benzene and BTEX columns. Clarification of which VOCs comprise this total VOCs column is needed.

The table has been modified in the revised Technical Memorandum.

33. **Appendix A.** Place a title on the table. In addition, several items need clarification, including, (a) provide explanations for certain concentrations being placed in italics; (b) as previously discussed, the total VOCs column appears confusing and needs additional clarification; (c) on page 2 of 15, GP-60 indicates an acetone concentration of 3560 with an asterisk. Provide a footnote to explain the meaning of the asterisk, and (d) the nomenclature utilized for trip and field blanks is inconsistent throughout the table (i.e., GPTB01 1/24/96, GP-1/26/96/TB, TB 2/1/96). Correct these inconsistencies.

Modification has been made in the revised Technical Memorandum.

34. **Appendix B.** This information or data was not timely submitted to IDEM. In the future, provide the information to both U.S. EPA and IDEM along with the document which it is supposed to be included in.

Appendix B was supplied to U.S. EPA because it was specifically requested. When IDEM requested it, it was also immediately supplied to IDEM.

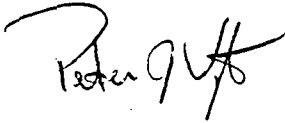
35. **Appendix B.** While reviewing the time-series data for IW-1 contained in Appendix B, U.S. EPA noted that tetrachloroethene (PCE) concentrations dropped from approximately 10 to 12 ug/l near the start of the pumping and leveled off at about 5 ug/l after 180 minutes. In reporting this data, it is not accurate to state that the time series data indicated that PCE concentrations at the well began high and then over time dropped to zero. Rather it appears that PCE concentrations from 180 to the end of the test (i.e., 480 minutes) leveled off at a concentration of approximately 5 UG/L. This may be important in the lower aquifer technical memorandum as well as the well abandonment proposal.

Time-series sampling was conducted as part of the Lower Aquifer Investigation and was therefore included in the Lower Aquifer Technical Memorandum, submitted to U.S. EPA on May 3, 1996.

As noted above, if questions remain after the U.S. EPA and IDEM have reviewed these responses, we are interested in meeting with you and your management to resolve any remaining issues. We look forward to hearing from you once your review is completed.

Very Truly Yours,

MONTGOMERY WATSON INC.



Peter J. Vagt, Ph.D., CPG  
Vice President

cc: Holly Grejda, IDEM (5)  
Steve Mrkvika, B&BWS, (2)  
ACS Technical Committee

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